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(54) RADIATION FAN DEVICE FOR PDP

(57)Abstract:

PROBLEM TO BE SOLVED: To prevent a radiation fan in a display device using PDP from generating a jarring rotating noise.

SOLUTION: The rotational speed of the radiation fane 7 preset according to ambient temperature is stored in a memory part 2, and the ambient temperature is detected by an ambient temperature detecting part 1 and inputted into a discriminating part 3. The rotational speed is discriminated in comparison with the data read out of the memory part. The fan is made to start rotating by a fan control part 5 with the power of a display unit ON, speeded up linearly from zero to the above rotational speed in a prescribed time (e.g. 30 seconds) clocked by a clock part 4, and then rotated at the rotational speed corresponding to changes in the ambient temperature. Otherwise, the fan is speeded up linearly up to an appropriate rotational speed in a prescribed time after the power of the display unit is turned

on and then linearly to the rotational speed corresponding to the ambient temperature in a prescribed time. Otherwise, the fan is stopped while the ambient temperature is low and is rotated in the same way as the above when the ambient temperature rises.

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CLAIMS

[Claim(s)]
[Claim 1] To what is a display using PDP (plasma display panel), and prepared the heat dissipation fan of a rotational-speed adjustable mold The memory section which memorizes the rotational frequency of a heat dissipation fan's unit time amount which was made to correspond to an OAT and was set up, The outside-air-temperature detecting element which detects the temperature of the open air of said indicating equipment, and the distinction section which distinguishes the rotational frequency which ****s in the OAT from an outside-air-temperature detecting element by the data read from the memory section, Said heat dissipation fan to the rotational frequency which was made to carry out revolution

initiation by power-source ON of a display, and was distinguished in the distinction section at the time of revolution initiation Heat dissipation fan equipment of PDP which a rotational frequency is gradually raised to predetermined time, and comes henceforth to prepare the fan control section which makes it rotate at the rotational frequency which ****s in an OAT, and the control section which controls said memory section, an outside-air-temperature detecting element, the distinction section, and a fan control section.

[Claim 2] Heat dissipation fan equipment of PDP according to claim 1 controlled to make it rotate at the rotational frequency which the time amount computed based on the rotational frequency which ****s a heat dissipation fan in the OAT at the time of revolution initiation by said fan control section is gradually raised to this rotational frequency, and ****s in it henceforth at an OAT.

[Claim 3] Heat dissipation fan equipment of PDP according to claim 1 controlled to make it rotate at the rotational frequency which the time amount defined based on the range of the rotational frequency which ****s a heat dissipation fan in the OAT at the time of revolution initiation by said fan control section is gradually raised to this rotational frequency, and ****s in it henceforth at an OAT.

[Claim 4] Heat dissipation fan equipment of PDP according to claim 1 which a predetermined rotational frequency smaller than the minimum rotational frequency set as predetermined time by said fan control section in the heat dissipation fan corresponding to the OAT is raised, and predetermined time is gradually raised to the rotational frequency which ****s in the OAT when reaching this rotational frequency after an appropriate time, and was controlled after that to make it rotate at the rotational frequency which ****s in an OAT.

[Claim 5] Heat-dissipation fan equipment of PDP according to claim 1 controlled to make it rotate at the rotational frequency which the time amount computed based on the rotational frequency which ****s in the OAT when raising a predetermined rotational frequency smaller than the minimum rotational frequency set as predetermined time by said fan control section in the heat dissipation fan corresponding to the OAT, and reaching said rotational frequency after an appropriate time is gradually raised to this rotational frequency, and ****s in it henceforth at an OAT.

[Claim 6] The heat-dissipation fan equipment of PDP according to claim 1 which controlled to make it rotate at the rotational frequency which the time amount defined based on the range of the rotational frequency which ****s in the OAT when raising a predetermined rotational frequency smaller than the minimum rotational frequency set as predetermined time by said fan control section in the heat-dissipation fan corresponding to the OAT, and reaching said rotational frequency after an appropriate time is gradually raised to this rotational frequency, and ****s in it henceforth at an OAT.

[Claim 7] Said fan control section is heat dissipation fan equipment of PDP according to claim 1 to 6 did not make rotate said heat dissipation fan when the OAT detected by said

outside-air-temperature detecting element was below predetermined temperature, but it was made to make rotate a heat dissipation fan when an OAT was beyond predetermined temperature.

[Claim 8] Heat dissipation fan equipment of PDP according to claim 1 to 7 which prepares the DA converter which changes the control signal from said fan control section into the electrical potential difference of an analog, and supplied the electrical potential difference from a DA converter to said heat dissipation fan.

[Claim 9] Said fan control section is heat dissipation fan equipment of PDP according to claim 1 to 8 which comes to be what is controlled to make a rotational frequency increase linearly when raising said heat dissipation fan's rotational frequency.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the heat dissipation fan equipment of PDP (plasma display panel), and relates to the thing to which a heat dissipation fan's revolution sound enables it not to become jarring easily.

[0002]

[Description of the Prior Art] Depth of a case is shortened taking advantage of the description of the thin shape of PDP, and it enables it to install in the display using PDP, without taking a location. However, it becomes the cause of the heat generated in the actuation circuit of PDP and PDP etc. being hard to be emitted since the volume of a case is small, and the temperature in a case rising, and affecting the engine performance of PDP, and contracting the life of PDP or passive circuit elements. For this reason, a heat dissipation fan is prepared and forced cooling of the inside of a case is carried out. Use a rotational-speed adjustable mold for this heat dissipation fan, and it is made to rotate at the rotational frequency set up according to ambient temperature, and when predetermined time has passed this since power-source ON or power-source ON of a display, there are some which started the revolution.

[0003]

[Problem(s) to be Solved by the Invention] If the surrounding noise of a heat dissipation fan's revolution sound (whizzing sound) is loud at the time of revolution initiation, it is hard to be worrisome, but when it is under a quiet environment, a fan's revolution sound is worrisome and there is a problem of giving displeasure. This invention makes a heat dissipation fan's rotational frequency increase from zero gradually, and aims at a fan's revolution sound

enabling it not to be worrisome easily.

[0004]

[Means for Solving the Problem] In order to attain the above-mentioned object, with the heat dissipation fan equipment of PDP of this invention To what prepared the heat dissipation fan of a rotational-speed adjustable mold in the display using PDP The memory section which memorizes the rotational frequency of a heat dissipation fan's unit time amount which was made to correspond to an OAT and was set up, The outside-air-temperature detecting element which detects the temperature of the open air of an indicating equipment, and the distinction section which distinguishes the rotational frequency which ****s in the OAT from an outside-air-temperature detecting element by the data read from the memory section, A heat dissipation fan to the rotational frequency which was made to carry out revolution initiation by power-source ON of a display, and was distinguished in the distinction section at the time of revolution initiation A rotational frequency is gradually raised to predetermined time, and control-section **** which controls the fan control section which makes it rotate at the rotational frequency which ****s in an OAT, said memory section and an outside-air-temperature detecting element, the distinction section, and a fan control section is prepared and constituted henceforth.

[0005] In addition, you may make it control to make it rotate at the rotational frequency which the time amount computed based on the rotational frequency which ****s a heat dissipation fan in the OAT at the time of revolution initiation by the fan control section is gradually raised to this rotational frequency, and ****s in it henceforth at an OAT.

[0006] Or you may control to make it rotate at the rotational frequency which the time amount defined based on the range of the rotational frequency which ****s a heat dissipation fan in the OAT at the time of revolution initiation by the fan control section is gradually raised to this rotational frequency, and ****s in it henceforth at an OAT.

[0007] Or a predetermined rotational frequency smaller than the minimum rotational frequency set as predetermined time by the fan control section in the heat dissipation fan corresponding to the OAT is raised, predetermined time is gradually raised to the rotational frequency which ****s in the OAT when reaching this rotational frequency after an appropriate time, and you may make it control henceforth to make it rotate at the rotational frequency which ****s in an OAT.

[0008] Or a predetermined rotational frequency smaller than the minimum rotational frequency set as predetermined time by the fan control section in the heat dissipation fan corresponding to the OAT is raised. The time amount computed based on the rotational frequency which ****s in the OAT when reaching said rotational frequency after an appropriate time, Or you may control to make it rotate at the rotational frequency which the time amount defined based on the range of the rotational frequency which ****s in the OAT when reaching said rotational frequency is gradually raised to this rotational frequency, and

****s in it henceforth at an OAT.

[0009] A fan control section does not rotate a heat dissipation fan, when the OAT detected by the outside-air-temperature detecting element is below predetermined temperature, and when an OAT is beyond predetermined temperature, you may make it rotate a heat dissipation fan.

[0010] In addition, the DA converter which changes the control signal from a fan control section into the electrical potential difference of an analog is prepared, and the electrical potential difference from a DA converter is supplied to a heat dissipation fan.

[0011] A fan control section is controlled to make a rotational frequency increase linearly, when raising a heat dissipation fan's rotational frequency.

[0012]

[Embodiment of the Invention] The gestalt of implementation of invention is explained with reference to a drawing based on an example. Drawing 1 is the important section block diagram of one example of the heat dissipation fan equipment of PDP by this invention. The outside-air-temperature detecting element which 1 of drawing forms a temperature sensor in the case exterior of the display which used PDP, and detects the temperature of the open air, and 2 the rotational frequency per [which was made to correspond to an OAT and was set up] the heat dissipation fan's 7 unit time amount (25 degrees C -- 1000rpm --) The distinction section which distinguishes the rotational frequency which ****s in the OAT from the outside-air-temperature detecting element 1 by 2000rpm, the memory section which memorizes like .., and the data which read 3 from the memory section 2 at 30 degrees C, It is the control section by which the clock section in which 4 minces elapsed time, the fan control section by which 5 controls the heat dissipation fan's 7 revolution initiation and rotational frequency, DAC (DA converter) from which 6 changes the control signal from the fan control section 5 into the electrical potential difference of an analog, and 7 control the heat dissipation fan of a rotational-speed adjustable mold, and 8 controls each part.

[0013] Next, it explains by the technique 1-6 of showing actuation of the heat dissipation fan equipment of PDP by this invention to drawing 2 . In the case of "technique 1", the signal from the outside-air-temperature detecting element 1 is inputted into the distinction section 3 through a control section 8 by power-source ON of a display, it collates with the data read from the memory section 2 through the control section 8, and the rotational frequency R of the heat dissipation fan 7 who ****s in the OAT concerned is distinguished. And through a control section 8, the heat dissipation fan's 7 rotational frequency is gradually raised from zero by power-source ON of a display, and it controls by the fan control section 5 to become a rotational frequency R by the predetermined time amount T, for example, 30 seconds, clocked in the clock section 4. The heat dissipation fan 7 is the x (R/T) elapsed time t. A rotational frequency is linearly raised at the decided rotational frequency. And it is made to rotate henceforth at the rotational frequency which ****s to the temperature detected by the

outside-air-temperature detecting element 1 as usual. In addition, the fan control section 5 is the electrical potential difference E impressed to the heat dissipation fan 7 256 It divides, and a sequential-control signal is outputted to E (n/255) which ****s on the electrical potential difference to which the heat dissipation fan 7 becomes a rotational frequency R from E (0/255) between the above-mentioned time amount T, it changes into analog voltage by DAC6, and the heat dissipation fan 7 is supplied. The control signal is set up so that the heat dissipation fan's 7 rotational frequency may increase almost linearly on the electrical potential difference changed by DAC6, and it may output at a proper step (for example, E (0/255), E (3/255), E (8/255), E (15/255), ..).

[0014] "Technique 2" is the technique of changing the time amount T1 or T2 which reaches rotational frequencies R1 or R2 in the case (an OAT is high) where it is R2 with large case (an OAT is low) where it is R1 and rotational frequency with the small rotational frequency of the heat dissipation fan 7 who ****s in an OAT from the outside-air-temperature detecting element 1. Time amount T1 and T2 is a rotational frequency R1 or the (R2/ constant X) + constant Y, respectively. It carries out and considers as X= 100 and Y=10 grade. Constants X and Y take into consideration the rotational frequency of the heat dissipation fan's 7 motor, and determine it beforehand. This is for preventing raising and a rotational frequency rising a rotational frequency rapidly over time amount longer than the case where a rotational frequency is small, and a revolution sound becoming easy to ring in the lug, when the rotational frequency distinguished in the distinction section 3 is large. "Technique 3" is technique decided by the range of the rotational frequency which did not compute the time amount T1 and T2 of the above-mentioned technique 2 in a formula, but was distinguished in the distinction section 3. namely, -- for example, the distinguished rotational frequency -- 1000rpm a rotational frequency (distinguished) predetermined to time amount T1 when it is the following -- becoming -- a rotational frequency -- 1000 - 2000rpm it is -- it is made for a case to become a rotational frequency predetermined by the time amount T2 longer than time amount T1 Thereby, the same effectiveness as technique 2 is acquired. In addition, it is made to rotate at the rotational frequency to which it ****s in the OAT at that time like technique 1 after technique 2 and 3 reaches the distinguished rotational frequency.

[0015] "Technique 4" is controlled to raise the heat dissipation fan's 7 rotational frequency to the rotational frequency R1 smaller than the minimum rotational frequency set up between the time amount P set up suitably from power-source ON of a display corresponding to the OAT, and to go up linearly to the rotational frequency R2 which ****s in an OAT when the heat dissipation fan 7 reaches a rotational frequency R1 between time amount P+Q (it sets up suitably) from there. It is made by this not worrisome [without if possible making the heat dissipation effectiveness into a sacrifice / a fan's revolution sound]. In addition, after reaching a rotational frequency R2, it is made to rotate like technique 1-3 at the rotational frequency which ****s in the OAT at that time.

[0016] Between the time amount P which "technique 5" is what combined the above-mentioned technique 4 and technique 2 and 3, and set up the heat dissipation fan's 7 rotational frequency suitably from power-source ON of a display The rotational frequency R3 (it is the same as the rotational frequency R1 of technique 4) smaller than the minimum rotational frequency set up corresponding to the OAT is raised. And the point is if small [if the rotational frequency distinguished based on the OAT at that time is large like the technique 2 or 3 of being a **** (R2), the long time amount T2 will be spent, and] (R1). It is the short time amount T1, and it is made to reach the rotational frequency concerned, raising a rotational frequency linearly.

[0017] Although, as for each above, a revolution of the heat dissipation fan 7 starts in power-source ON of a display, "technique 6" does not rotate the heat dissipation fan 7, when the OAT detected by the outside-air-temperature detecting element 1 at the time of power-source ON of a display is below predetermined temperature, and it is made to rotate the heat dissipation fan 7 by the technique of the above-mentioned technique 1-5, when it becomes beyond predetermined temperature. Thereby, while an OAT is low, since the heat dissipation fan 7 does not rotate, he loses revolution sound itself and can cut down power consumption simultaneously.

[0018]

[Effect of the Invention] As explained above, according to the heat dissipation fan equipment of PDP by this invention Since a heat dissipation fan's rotational frequency is made to increase gradually (linearly) from zero to a predetermined rotational frequency It becomes what a heat dissipation fan's revolution sound cannot worry easily sensuously, and can avoid giving displeasure to conventional power-source ON and the coincidence of a display compared with the case where the full revolution of the heat dissipation fan is carried out at a predetermined rotational frequency.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the important section block diagram of one example of the heat dissipation fan equipment of PDP by this invention.

[Drawing 2] It is the explanatory view of the control technique (technique 1-6) of a heat dissipation fan's rotational frequency.

[Description of Notations]

1 Outside-Air-Temperature Detecting Element

2 Memory Section

3 Distinction Section
4 Clock Section
5 Fan Control Section
6 DA Converter
7 Heat Dissipation Fan
8 Control Section

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Ｈ０４Ｎ　5/66	１０１	Ｈ０４Ｎ　5/66	１０１Ｚ	５Ｅ３２２
Ｈ０５Ｋ　7/20		Ｈ０５Ｋ　7/20	Ｊ	５Ｇ４３５
// Ｈ０４Ｎ　5/64	５４１	Ｈ０４Ｎ　5/64	５４１Ｊ	

審査請求　未請求　請求項の数９　ＯＬ　（全４頁）

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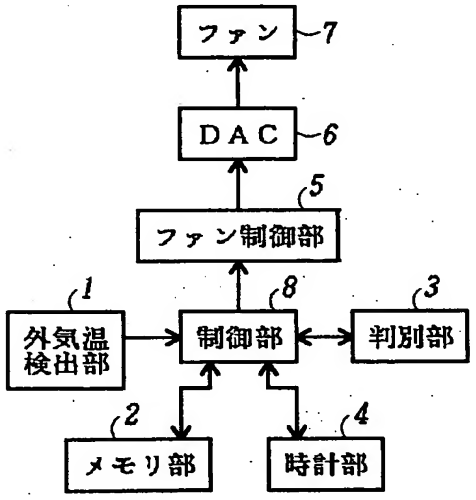
(54)【発明の名称】　ＰＤＰの放熱ファン装置

(57)【要約】
【課題】　ＰＤＰを用いた表示装置の放熱ファンの回転音が気になりにくいようにする。
【解決手段】　メモリ部２に外気温度に応じて設定された放熱ファン７の回転数を記憶し、外気温検出部１で外気温度を検出し、判別部３に入力し、メモリ部より読出したデータと照合して回転数を判別し、表示装置の電源オンにてファン制御部５によりファンを回転開始し、ゼロから直線的に上げ、時計部４で計時する所定の時間（例：30秒）で上記回転数にし、以降、外気温度の変動に応じて対応する回転数で回転させる。または、表示装置の電源オンから所定の時間で適宜の回転数まで直線的に上げ、次いで、このときの外気温度に相応する回転数まで、所定の時間で直線的に回転数を上げる。または、外気の温度が低い間はファンを止め、外気温度が上昇したとき上記と同様にファンを回転させる。



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【特許請求の範囲】

【請求項１】　ＰＤＰ（プラズマディスプレイパネル）を用いた表示装置であって、回転速度可変型の放熱ファンを設けたものに、外気温度に対応させて設定された放熱ファンの単位時間の回転数を記憶するメモリ部と、前記表示装置の外気の温度を検出する外気温検出部と、メモリ部より読出したデータにて外気温検出部よりの外気温度に相応する回転数を判別する判別部と、前記放熱ファンを、表示装置の電源オンにて回転開始させ、回転開始時に判別部で判別された回転数まで、所定時間に回転数を徐々に上昇させ、以降、外気温度に相応する回転数で回転させるファン制御部と、前記メモリ部、外気温検出部、判別部およびファン制御部を制御する制御部とを設けてなるＰＤＰの放熱ファン装置。

【請求項２】　前記ファン制御部により放熱ファンを、回転開始時の外気温度に相応する回転数を基に算出される時間に、該回転数まで徐々に上昇させ、以降、外気温度に相応する回転数で回転させるように制御するようにした請求項１記載のＰＤＰの放熱ファン装置。

【請求項３】　前記ファン制御部により放熱ファンを、回転開始時の外気温度に相応する回転数の範囲に基づき定めた時間に、該回転数まで徐々に上昇させ、以降、外気温度に相応する回転数で回転させるように制御するようにした請求項１記載のＰＤＰの放熱ファン装置。

【請求項４】　前記ファン制御部により放熱ファンを、所定時間に、外気温度に対応して設定された最小回転数より小さい所定の回転数に上昇させ、しかる後、該回転数に達したときの外気温度に相応する回転数まで所定時間に徐々に上昇させ、以降、外気温度に相応する回転数で回転させるように制御するようにした請求項１記載のＰＤＰの放熱ファン装置。

【請求項５】　前記ファン制御部により放熱ファンを、所定時間に、外気温度に対応して設定された最小回転数より小さい所定の回転数に上昇させ、しかる後、前記回転数に達したときの外気温度に相応する回転数を基に算出される時間に、該回転数まで徐々に上昇させ、以降、外気温度に相応する回転数で回転させるように制御するようにした請求項１記載のＰＤＰの放熱ファン装置。

【請求項６】　前記ファン制御部により放熱ファンを、所定時間に、外気温度に対応して設定された最小回転数より小さい所定の回転数に上昇させ、しかる後、前記回転数に達したときの外気温度に相応する回転数の範囲に基づき定めた時間に、該回転数まで徐々に上昇させ、以降、外気温度に相応する回転数で回転させるように制御するようにした請求項１記載のＰＤＰの放熱ファン装置。

【請求項７】　前記ファン制御部は、前記外気温検出部で検出された外気温度が所定の温度以下の場合は前記放熱ファンを回転させず、外気温度が所定の温度以上の場合に放熱ファンを回転させるようにした請求項１乃至６

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のいずれかに記載のＰＤＰの放熱ファン装置。

【請求項８】　前記ファン制御部からの制御信号をアナログの電圧に変換するＤＡコンバータを設け、ＤＡコンバータよりの電圧を前記放熱ファンに供給するようにした請求項１乃至７のいずれかに記載のＰＤＰの放熱ファン装置。

【請求項９】　前記ファン制御部は、前記放熱ファンの回転数を上げるときは回転数を直線的に増加させるように制御するものでなる請求項１乃至８のいずれかに記載のＰＤＰの放熱ファン装置。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明はＰＤＰ（プラズマディスプレイパネル）の放熱ファン装置に係り、放熱ファンの回転音が耳障りになりにくいようにするものに関する。

【０００２】

【従来の技術】ＰＤＰを用いた表示装置では、ＰＤＰの薄型という特徴を生かして筐体の奥行きを短くし、場所をとらずに設置できるようにしている。しかし、筐体の容積が小さいためＰＤＰおよびＰＤＰの駆動回路等で発生する熱が放出されにくく、筐体内の温度が上昇し、ＰＤＰの性能に影響を及ぼし、また、ＰＤＰあるいは回路部品の寿命を縮める原因となる。このため、放熱ファンを設けて筐体内を強制冷却している。この放熱ファンに回転速度可変型を用い、周囲温度に応じて設定された回転数で回転させ、これを、表示装置の電源オンまたは電源オンから所定時間が経過したとき回転を開始するようにしたものがある。

【０００３】

【発明が解決しようとする課題】放熱ファンの回転音（風切り音）は、回転開始のとき周囲の騒音が大きければ気になりにくいが、静かな環境下にある場合、ファンの回転音が気になり、不快感を与えるという問題がある。本発明は、放熱ファンの回転数をゼロから徐々に増加させ、ファンの回転音が気になりにくいようにすることを目的とする。

【０００４】

【課題を解決するための手段】上記目的を達成するため、本発明のＰＤＰの放熱ファン装置では、ＰＤＰを用いた表示装置に回転速度可変型の放熱ファンを設けたものに、外気温度に対応させて設定された放熱ファンの単位時間の回転数を記憶するメモリ部と、表示装置の外気の温度を検出する外気温検出部と、メモリ部より読出したデータにて外気温検出部よりの外気温度に相応する回転数を判別する判別部と、放熱ファンを、表示装置の電源オンにて回転開始させ、回転開始時に判別部で判別された回転数まで、所定時間に回転数を徐々に上昇させ、以降、外気温度に相応する回転数で回転させるファン制御部と、前記メモリ部、外気温検出部、判別部およびフ

ファン制御部を制御する制御部とをを設けて構成する。

【０００５】なお、ファン制御部により放熱ファンを、回転開始時の外気温度に相応する回転数を基に算出される時間に、該回転数まで徐々に上昇させ、以降、外気温度に相応する回転数で回転させるように制御するようにしてもよい。

【０００６】または、ファン制御部により放熱ファンを、回転開始時の外気温度に相応する回転数の範囲に基づき定めた時間に、該回転数まで徐々に上昇させ、以降、外気温度に相応する回転数で回転させるように制御してもよい。

【０００７】あるいは、ファン制御部により放熱ファンを、所定時間に、外気温度に対応して設定された最小回転数より小さい所定の回転数に上昇させ、しかる後、該回転数に達したときの外気温度に相応する回転数まで所定時間に徐々に上昇させ、以降、外気温度に相応する回転数で回転させるように制御するようにしてもよい。

【０００８】または、ファン制御部により放熱ファンを、所定時間に、外気温度に対応して設定された最小回転数より小さい所定の回転数に上昇させ、しかる後、前記回転数に達したときの外気温度に相応する回転数を基に算出される時間、または、前記回転数に達したときの外気温度に相応する回転数の範囲に基づき定めた時間に、該回転数まで徐々に上昇させ、以降、外気温度に相応する回転数で回転させるように制御してもよい。

【０００９】ファン制御部は、外気温検出部で検出された外気温度が所定の温度以下の場合は放熱ファンを回転させず、外気温度が所定の温度以上の場合に放熱ファンを回転させるようにしてもよい。

【００１０】なお、ファン制御部からの制御信号をアナログの電圧に変換するＤＡコンバータを設け、ＤＡコンバータよりの電圧を放熱ファンに供給するようにする。

【００１１】ファン制御部は、放熱ファンの回転数を上げるときは回転数を直線的に増加させるように制御する。

【００１２】

【発明の実施の形態】発明の実施の形態を実施例に基づき図面を参照して説明する。図１は本発明によるＰＤＰの放熱ファン装置の一実施例の要部ブロック図である。図の１は、ＰＤＰを用いた表示装置の、筐体外部に温度センサを設けて外気の温度を検出する外気温検出部、２は、外気温度に対応させて設定された放熱ファン７の単位時間当たりの回転数（25℃で1000rpm 、30℃で2000rpm 、・・の如く）を記憶するメモリ部、３はメモリ部２より読出したデータにて外気温検出部１よりの外気温度に相応する回転数を判別する判別部、４は経過時間を刻む時計部、５は放熱ファン７の回転開始および回転数を制御するファン制御部、６はファン制御部５からの制御信号をアナログの電圧に変換するＤＡＣ（ＤＡコンバータ）、７は回転速度可変型の放熱ファン、８は各部を制御する制御部である。

【００１３】次に、本発明によるＰＤＰの放熱ファン装置の動作を、図２に示す手法１～６で説明する。「手法１」の場合、表示装置の電源オンにて、外気温検出部１よりの信号は制御部８を介し判別部３に入力し、制御部８を介しメモリ部２より読出したデータと照合し、当該外気温度に相応する放熱ファン７の回転数Ｒを判別する。そして、制御部８を介しファン制御部５により、放熱ファン７の回転数を表示装置の電源オンでゼロから徐々に上昇させ、時計部４で計時される所定の時間Ｔ、例えば、30秒で回転数Ｒになるように制御する。放熱ファン７は、（Ｒ÷Ｔ）×経過時間ｔ　で決まる回転数で直線的に回転数を上げる。そして、以降は従来同様、外気温検出部１で検出された温度に相応する回転数で回転させる。なお、ファン制御部５は、例えば、放熱ファン７に印加する電圧Ｅを256 分割し、上記時間Ｔの間に、(0/255)Eから放熱ファン７が回転数Ｒとなる電圧に相応する(n/255)Eまで順次制御信号を出力し、ＤＡＣ６でアナログ電圧に変換し、放熱ファン７に供給する。制御信号は、ＤＡＣ６で変換された電圧で放熱ファン７の回転数がほぼ直線的に増加するように、適宜のステップ（例えば、(0/255)E、(3/255)E、(8/255)E、(15/255)E 、・・）で出力するように設定しておく。

【００１４】「手法２」は、外気温検出部１からの外気温度に相応する放熱ファン７の回転数が小さいR1の場合（外気温度が低い）と回転数が大きいR2の場合（外気温度が高い）とで回転数R1またはR2に達する時間T1またはT2を変える手法である。時間T1、T2は、それぞれ、（回転数R1またはR2÷定数Ｘ）＋定数Ｙ　とし、Ｘ＝100、Ｙ＝10等とする。定数ＸおよびＹは放熱ファン７のモータの回転数を勘案して予め決めておく。これは、判別部３で判別された回転数が大きい場合、回転数が小さい場合より長い時間をかけて回転数を上げ、回転数が急激に上昇して回転音が耳に付きやすくなるのを防ぐためである。「手法３」は、上記手法２の時間T1とT2を計算式で算出するのではなく、判別部３で判別された回転数の範囲によって決める手法である。すなわち、例えば、判別された回転数が1000rpm 以下の場合は時間T1に所定の（判別された）回転数になり、回転数が1000～2000rpm の場合は時間T1より長い時間T2で所定の回転数になるようにする。これにより、手法２と同様の効果が得られる。なお、手法２、３共、判別された回転数に達した後は、手法１と同様、その時の外気温度に相応する回転数で回転させる。

【００１５】「手法４」は、放熱ファン７の回転数を、表示装置の電源オンから適宜に設定した時間Ｐの間に、外気温度に対応して設定された最小回転数より小さい回転数R1に上昇させ、そこから時間Ｐ＋Ｑ（適宜に設定）の間に、放熱ファン７が回転数R1に達したときの外気温度に相応する回転数R2まで、直線的に上昇するように制

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御する。これにより、放熱効果をなるべく犠牲にせずにファンの回転音が気にならないようにする。なお、回転数R2に達した後は、手法１～３と同様、その時の外気温度に相応する回転数で回転させる。

【００１６】「手法５」は上記手法４と手法２、３を組み合わせたもので、放熱ファン７の回転数を、表示装置の電源オンから適宜に設定した時間Ｐの間に、外気温度に対応して設定された最小回転数より小さい回転数R3（手法４の回転数R1と同じ）に上昇させ、それから先は上述の手法２または３と同様、その時の外気温度に基づき判別される回転数が大きければ(R2)長い時間T2をかけ、小さければ（R1）短い時間T1で、回転数を直線的に上げながら当該回転数に達するようにする。

【００１７】上記はいずれも表示装置の電源オンで放熱ファン７の回転が始まるものであるが、「手法６」は、表示装置の電源オン時に外気温検出部１で検出される外気温度が所定の温度以下のときは放熱ファン７を回転させず、所定の温度以上になったとき、上述の手法１～５の手法で放熱ファン７を回転させるようにする。これにより、外気温度が低い間は放熱ファン７は回転しないので、回転音そのものがなくなり、同時に消費電力を減らすことができる。

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【００１８】

【発明の効果】以上に説明したように、本発明によるＰＤＰの放熱ファン装置によれば、放熱ファンの回転数をゼロから所定の回転数まで徐々に（直線的に）増加させるものであるから、従来の、表示装置の電源オンと同時に放熱ファンを所定の回転数でフル回転させる場合に比べ、放熱ファンの回転音が感覚的に気になりにくいものとなり、不快感を与えないようにすることができる。

【図面の簡単な説明】

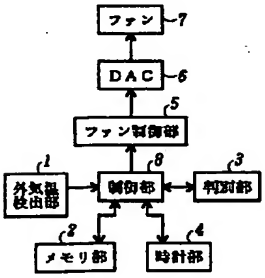
【図１】本発明によるＰＤＰの放熱ファン装置の一実施例の要部ブロック図である。

【図２】放熱ファンの回転数の制御手法（手法１～６）の説明図である。

【符号の説明】

1　外気温検出部
2　メモリ部
3　判別部
4　時計部
5　ファン制御部
6　ＤＡコンバータ
7　放熱ファン
8　制御部

【図１】



【図２】